InRow™ RA

SKUs
ACRA100
ACRA101

Technical Data

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Overview

The InRow RA offers efficient, effective, and economical cooling.

Critical environmental requirements now reach far beyond the confines of the traditional data center or computer room to encompass a larger suite of applications referred to as technology rooms. Critical environment applications include:

- Computer rooms
- Telecommunication facilities
- Clean rooms
- Power Equipment
- Medical equipment rooms
- Archives
- LAN/WAN environments

A worldwide network of APC representatives is fully qualified to provide engineering, sales, installation, and service for our products. APC warrants all parts for 12 months from commissioning or 18 months from the shipping date. Parts and labor is warranted if factory start-up is conducted. Extended warranties are available.

Capacity

The InRow RA unit provides cooling using low temperature R134a refrigerant supplied by a Refrigerant Distribution Unit (RDU). The nominal cooling capacity of the equipment is 29 kW.

Configuration

Pumped refrigerant.

Note: This unit must be used with an RDU.

Compliance approval

- UL Listed
- C-UL Listed
- CE

Standard features

- Insulated side panels
- Dual power inputs (A-B feed) via locking NEMA or IEC plug
- Variable speed direct drive mixed flow AC fan assembly
- Remote temperature sensor
- Microprocessor controller
- Failure warnings
- Controlled relative to dewpoint
- Active response controls
- Micro-channel coil
- Threaded ring seal pipe adapters
- Baying kit
- Washable filter

Accessories

- Hard piping kits
- Stainless steel flex piping kits
- NetShelter SX height adapters
- NetShelter VX height adapters
- Rack Air Containment
- Hot Aisle Containment

Refrigerant

Mitigating the risk of fluid leaks is critical to the smooth operation of a technology room. Data centers can be installed where raised floors are not available. This hard floor environment requires that the cooling fluid piping be installed overhead. The fluid used in this modular, pumped refrigerant system is R134a refrigerant. R134a is a non-toxic refrigerant that poses no threat to IT equipment in the event of a leak, and has no ozone depletion potential.

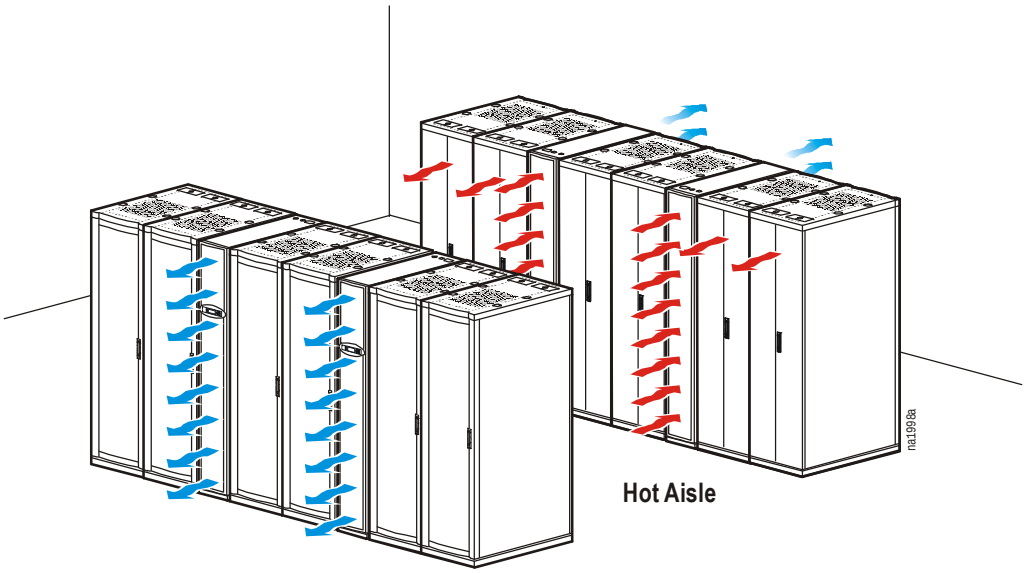
APC pumped refrigerant system, the right solution

Highly scalable and flexible, the system is capable of growing with your cooling needs as they increase. Ideal for low, medium and high density environments, the InRow RA integrates thermal containment and variable airflow for maximum energy efficiency.

Scalable Solution for Critical Environments

InRow advantages

InRow cooling products improve energy efficiency and cooling ability in a number of ways. First, the InRow RA draws air directly from the hot aisle, allowing it to take advantage of higher heat transfer efficiency due to higher temperature differences. It can then discharge cool air directly back into the IT environment. This increases energy efficiency by reducing the distance that the air has to be moved to provide adequate cooling to the IT equipment. Row based cooling close couples the cooling units to the IT load, which enables the units to operate at a higher return and supply air temperatures yielding 100% sensible capacity.



Scalable for any density

The predictable performance of the row-based architecture makes it well-suited for low, medium and high density applications.

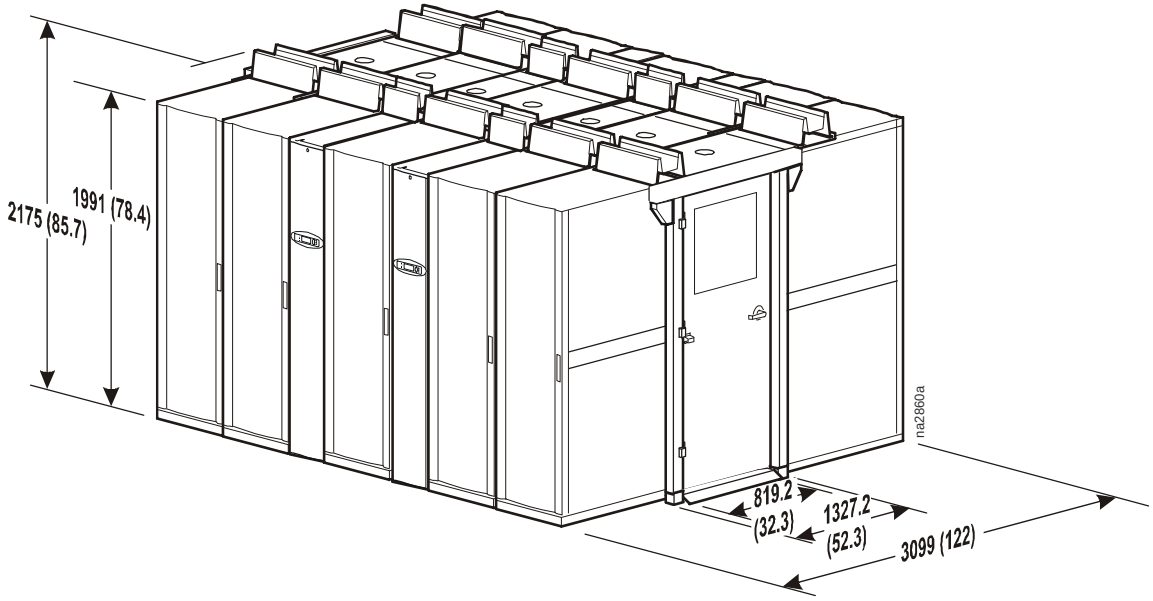
The additional benefit of the row-based architecture is the ability to add thermal containment. Containing the hot aisle further reduces any chance of hot and cold air streams mixing. This provides ultimate predictability and allows the cooling capacity to be matched to the IT heat load.

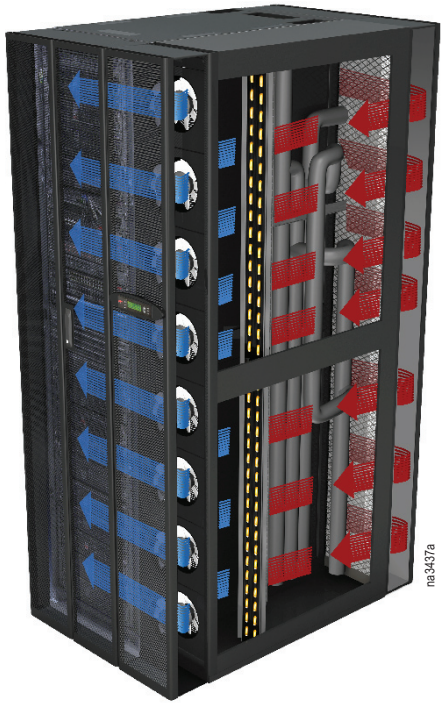
Thermal containment system

Various means may be used to enclose the hot aisle. This increases the efficiency of the cooling unit coil(s), and allows for cooling low, medium and high, or mixed density rack loads in any single rack enclosure by accumulating all IT server exhaust airflow in a common plenum, and eliminating mixing of hot and cold air streams.

The thermal containment system is designed to create a separate environment for air distribution in order to prevent mixing of hot and cold air streams, resulting in a more predictable cooling pattern. It also minimizes cooling airflow required for neutralizing rack heat loads, thereby saving on cooling unit fan power consumption.

The thermal containment system is beneficial in any environment and rack load densities.

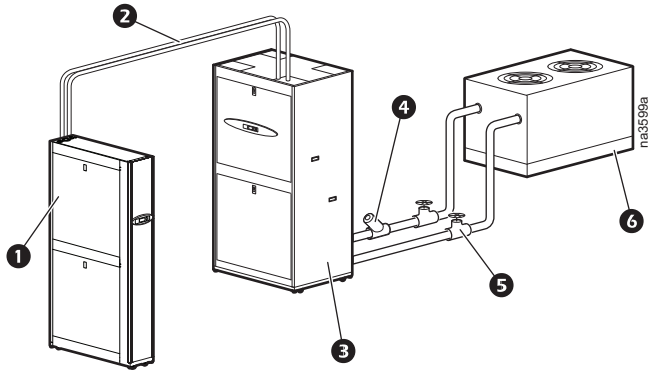




Configuration

Chilled water systems utilize water from a chiller plant for cooling. Chilled water is commonly used in large buildings and high rises and can serve multiple indoor units, which can be cost effective for large install options.

There are various methods for chilled water piping. The illustration below shows an InRow RA receiving pumped refrigerant from a centralized RDU which is in turn connected to a chiller plant.



❶	InRow RA	❹	Strainer**
❷	Refrigerant piping	❺	Valve**
❸	RDU*	❻	Chiller

Note: Install isolation valves and particulate strainers with 20 mesh stainless steel screen (opening size = 865 micron) in the supply line between the chiller and RDU. For more information, see the RDU Installation Manual.
*The RDU is a required unit available through APC. For more information, see the RDU Technical Data Manual.
**Piping between the chiller and the RDU will vary based on local codes and site conditions.

Standard Features

Cabinet

The frame is constructed of 16 gauge formed steel for maximum strength. The cabinet is serviceable from the front and rear. All exterior panels and corner posts on the frame are powder coated for durability and an attractive finish.

Front and rear exterior panels are constructed of 18 gauge perforated steel with 69.5% open free area.

Insulated side panels

Insulation is 80.1 kg/m^3 (5 lb/ft^3) density and complies with ASTM E84 rating of 25/50. All panels include a key latch for safety and security, allowing easy access and removal.

Electronics module

A retractable electronics module provides easy service access from the rear of the unit.

Remote shutdown

The unit is capable of being placed in RUN or STANDBY mode - password protected - through RDU or web interface.

Cooling coil

The cooling coil is an aluminum micro-channel heat exchanger supported by 14 gauge galvanized steel. The micro-channel improves heat transfer and thermal performance.

Variable speed fans

Five 250 mm diameter variable speed mixed flow direct drive AC axial fans provide uniform air flow over the entire face of the coil.

Each fan assembly has a plastic injection molded bezel with a cage-type finger guard on both the inlet and outlet sides.

Active response control

The active response control monitors rack inlets and controls cooling capacity to match the IT heat load. Included is a user-friendly interface for ease of operation.

Washable filters

The filtration of conditioned air is extremely vital to maintaining the clean, particle-free environment required by electrical equipment. The system uses a <20% efficiency ASHRAE 52.1, 12.7 mm (1/2 in) washable, deep loading, large dust-holding filter that meets HF-1 standards for electronics (MERV 1 per ASHRAE 52.2).

Failure notification

Several components within the unit will provide a warning that service is needed.

Remote temperature sensor

A field-installed remote temperature sensor is placed to provide control input based on rack inlet temperature.

Dual power feeds

Dual power inputs are supplied to the unit for power redundancy and protection via a locking NEMA or IEC plug connection suitable for the input power selected.

Optional Features

Flexible stainless steel hoses

914 mm (3 ft), 1372 mm (4.5 ft), and 1828 mm (6 ft) flexible stainless steel hoses are available for use in installations where the header piping is not used, allowing flexibility in header/connection placement.

Height adapters

To match the height of the ACRA to various rack heights, height adapters are available for NetShelter 42-U VX and 48-U SX racks.

Power trough

Overhead power distribution between adjacent NetShelter racks allows for removal of the ACRA without disrupting overhead power cabling.

Data partition

Overhead cable distribution between adjacent NetShelter racks allows for removal of the InRow ACRA without disrupting overhead cabling.

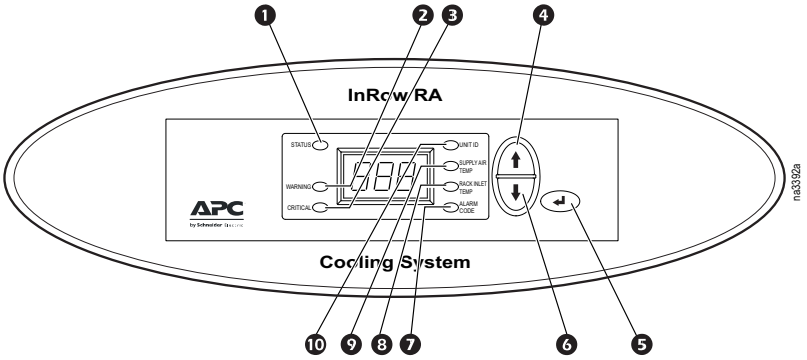
Network cable

Various lengths of network cable are available to order with your cooling system. The network cable is used to interconnect multiple cooling units in a group, as well as to connect back to the RDU.

Hard pipe kits

Male and female threaded ring seal adapters allow you to create custom piping for your application.

Microprocessor Controller



Item	Description
❶	Status LED
❷	Warning LED
❸	Critical alarm LED
❹	Menu selection scroll up key
❺	Enter key
❻	Menu selection scroll down key
❼	Alarm code LED
❽	Rack inlet temperature LED
❾	Supply air temperature LED
❿	Unit ID LED

Microprocessor control

The master display allows monitoring and configuring the air conditioning unit. Available functions include status reporting, set-up, and temperature setpoints. Four LEDs report the operational status of the connected cooling unit.

Controls

The microprocessor controller comes equipped with control keys to allow the user to navigate between menus and select items.

Alarms

The microprocessor controller activates a visible alarm in the occurrence of the following events:

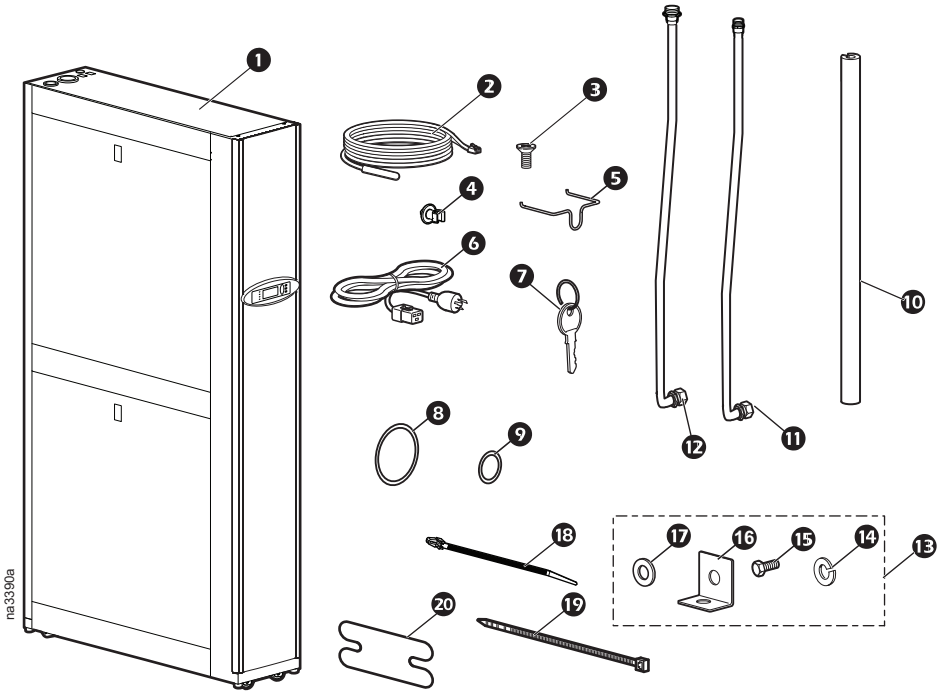
- Air filter service interval expired
- Evaporative temperature below dewpoint
- Individual fan fault
- Group communication fault
- Liquid inlet pressure sensor fault
- Liquid temperature sensor fault
- Primary power source failure
- Primary/secondary power source overvoltage
- Primary/secondary power source failure
- Rack temperature sensor fault
- Rack temperature high violation
- RDU communications fault
- Return air high temperature violation
- Return air temperature sensor fault
- Supply air high temperature violation
- Supply air temperature sensor fault
- Unit ID needs configuration
- Unit personality not configured
- Vapor outlet pressure sensor failure
- Vapor temperature sensor fault

Display interface

The three-digit, seven-segment display relays sensor readings, the identification number of the RA, and alarms by number only.

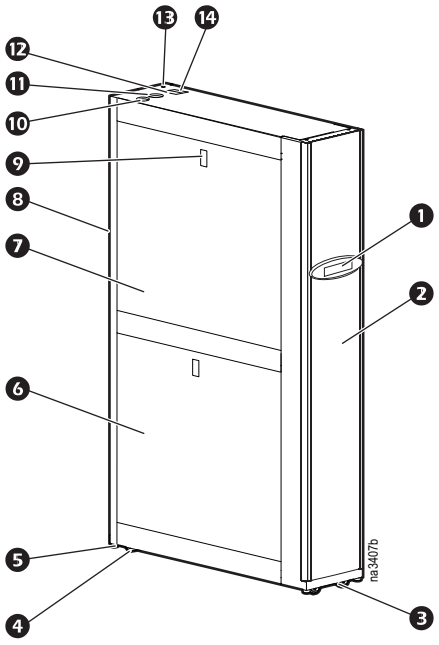
Component Identification

Loose parts kit



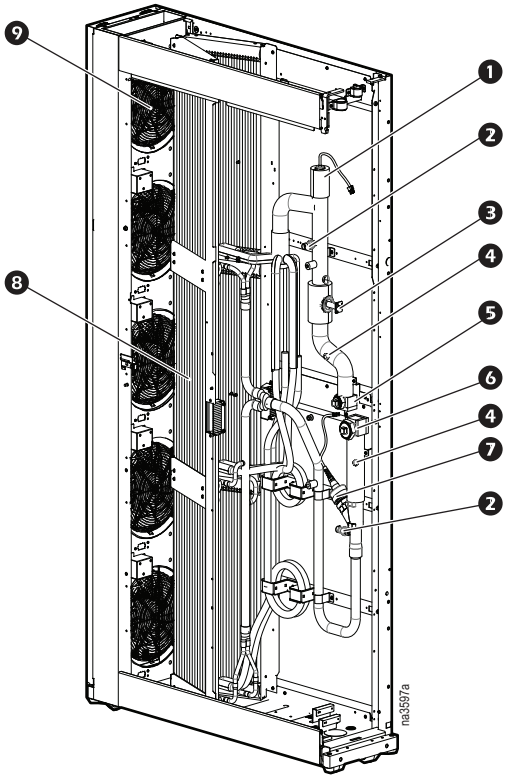
Item	Description	Qty	Item	Description	Qty
❶	InRow RA	1	⓫	Return vapor line	1
❷	Rack inlet temperature sensor	1	⓬	Supply liquid line	1
❸	Phillips head screws	4	⓭	Netshelter SX bolt-down kit	1
❹	Cable clips	3	⓮	Lockwashers	4
❺	Power cord retaining clips	2	⓯	Bolts	4
❻	Power cords	2	⓰	Brackets	4
❼	Key	1	⓱	Washers	4
❽	Teflon rings, 1-3/4 in	3	⓲	Nylon push mounts	4
❾	Teflon rings, 1-1/4 in	3	⓳	Wire ties	3
❿	Insulation (supply and return piping)	2	⓴	Insulation (pipe clamps)	2

Exterior components (front)



Item	Description	Item	Description
❶	CoolView display	❽	Removable rear door
❷	Removable front door	❾	Upper side panel latch
❸	Front casters (swiveling)	❿	Supply liquid connection
❹	Rear casters (non-swiveling)	⓫	Return vapor connection
❺	Adjustable leveling foot	⓬	Secondary power connection
❻	Removable lower side panel	⓭	Low voltage wiring input
❼	Removable upper side panel	⓮	Primary power connection

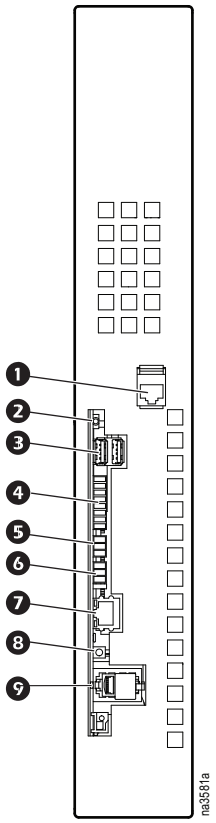
Interior components (rear view)



Note: Some parts, frame and side structure have been removed from this illustration for clarity.

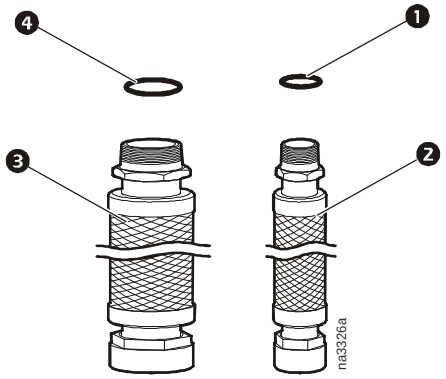
Item	Description	Item	Description
❶	Electronic expansion valve (EEV)	❻	Return vapor out
❷	Pressure sensor	❼	Evaporator pressure regulator (EPR)
❸	Solenoid valve	❽	Cooling coil
❹	Service port Schrader valve	❾	Fan
❺	Liquid supply in		

Electrical panel



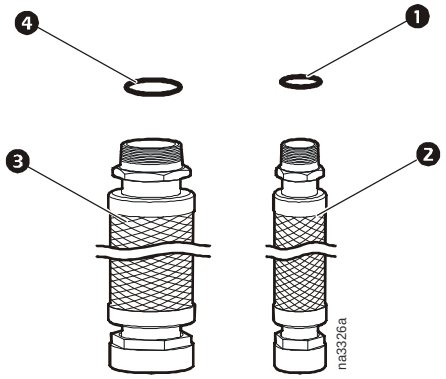
Item	Description	Item	Description
❶	Remote temperature sensor port	❻	Modbus RS-485 port
❷	Configuration RS-232 port	❼	Network port
❸	USB	❽	Reset button
❹	Form C and shutdown input	❾	A-Link port
❺	Control RS-485 port		

914 mm (3 ft) stainless steel flex pipe kit - ACAC21007



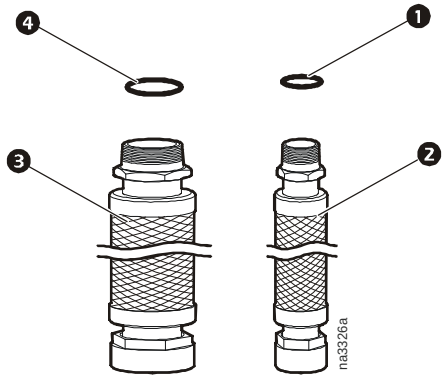
Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.25 in	2	❸	Hose, 1.25 in OD, 914 mm (3 ft)	1
❷	Hose, 1 in OD, 914 mm (3 ft)	1	❹	Teflon ring, 1.75 in	2

1828 mm (6 ft) stainless steel flex pipe kit - ACAC21008



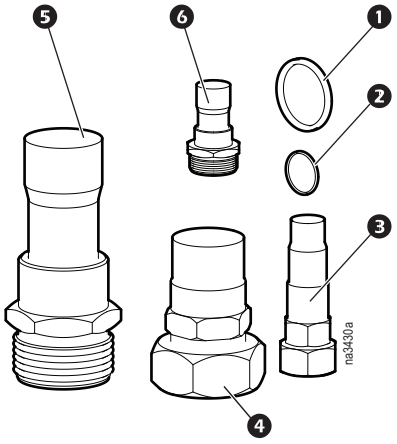
Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.25 in	2	❸	Hose, 1.25 in OD, 1828 mm (6 ft)	1
❷	Hose, 1 in OD, 1828 mm (6 ft)	1	❹	Teflon ring, 1.75 in	2

1372 mm (4.5 ft) stainless steel flex pipe kit - ACAC21009



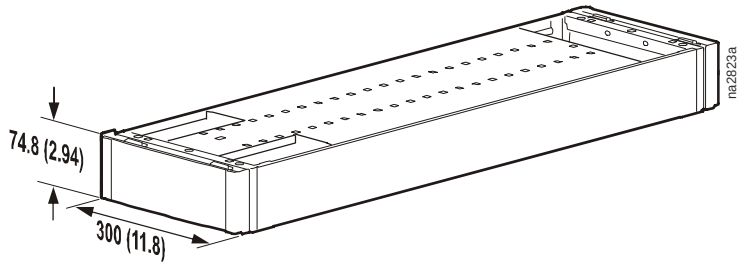
Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.25 in	2	❸	Hose, 1.25 in ID, 1372 mm (4.5 ft)	1
❷	Hose, 1 in ID, 1372 mm (4.5 ft)	1	❹	Teflon ring, 1.75 in	2

R134a connection kit - ACAC21010

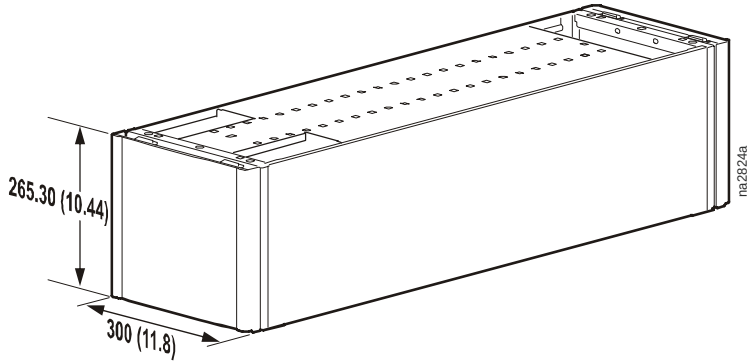


Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.75 in	2	❹	Gas outlet assembly, female	1
❷	Teflon ring, 1.25 in	2	❺	Gas outlet assembly, male	1
❸	Liquid inlet assembly, female	1	❻	Liquid inlet assembly, male	1

SX to VX height adapter - ACAC10003

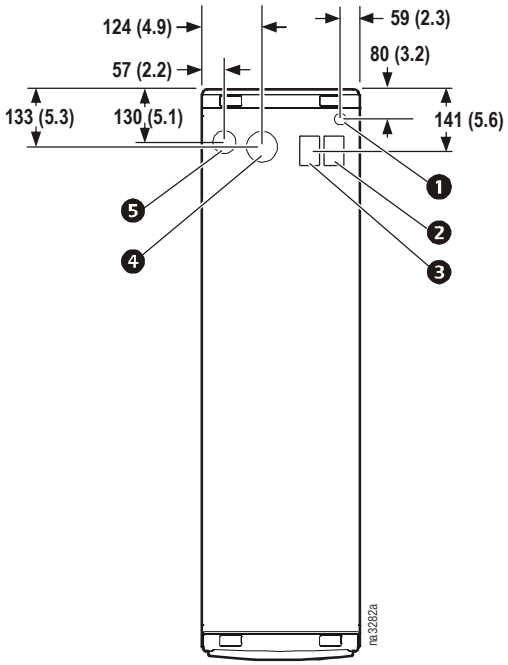


SX to 48U SX height adapter ACAC10007



Note: Dimensions are shown in mm (in).

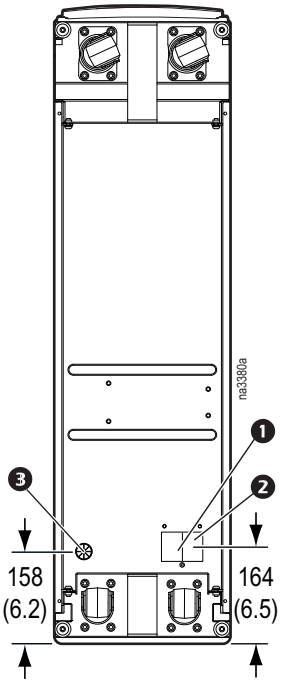
Top Piping and Power Access Locations



Item	Description
❶	Low voltage wiring input
❷	Primary electrical input
❸	Secondary electrical input
❹	Return vapor line
❺	Supply liquid line

Bottom Power Access Locations

Viewed from bottom looking up.



Item	Description
❶	Secondary electrical input
❷	Primary electrical input
❸	Low voltage wiring input

Determining Cooling Capacity

How to Determine Capacity of the InRow RA Cooling Unit

IT equipment requires two acceptable limits in order for effective cooling to occur. These parameters are inlet air temperature and flow rate of air through the IT equipment. It is entirely possible, though undesirable, to design a computer room with enough heat removal capacity but with an inadequate volumetric flow rate of cool air supply. When this condition exists, IT equipment will be subjected to excessively high operating temperatures on a localized basis due to recirculation, and cooling equipment will operate at less than optimal efficiency. APC provides the necessary data to prevent this undesirable situation. The first table, titled “Recommended Capacity Limitations,” shows the capacity limits based on air flow of the InRow RA. The following tables, titled “Performance Specifications”, show the recommended maximum amount of load that should be placed upon the cooling unit solely based on heat removal capability. The lesser of the two capacity numbers obtained from the “Recommended Capacity Limitations” table and “Performance Specification” table should be considered the maximum load capable of being served by the InRow RA. A definition of the terms in these tables follows:

IT equipment air flow (l/s/kW) (cfm/kW)
The average cooling air flow rate demanded by IT equipment in liters per second (cubic feet per minute) divided by the total actual power dissipation of IT equipment in kilowatts.

Recommended capacity limit (kW)
The corresponding maximum load in kilowatts capable of being served by the cooling unit solely based on conservation of volumetric air flow.

DB (°F and °C)
The dry bulb temperature in degrees Fahrenheit and Celsius of the return air stream to the cooling unit.

WB (°F and °C)
The wet bulb temperature in degrees Fahrenheit and Celsius of the return air stream to the cooling unit.

CW delta T (°F and °C)
The difference in temperature in degrees Fahrenheit between chilled water entering and exiting the cooling unit.

Sensible net capacity (BTU/hr and kW)
The sensible net heat removal capacity of fan heat, of the cooling unit at stated operating conditions.

Total net capacity (BTU/hr and kW)
The total (sensible + latent) net heat removal capacity of fan heat, of the cooling unit at stated operating conditions.

Recommended Capacity Limitations

ACRA100

IT Equipment ΔT	IT Equipment Air Flow	Recommended Capacity Limit		
		100 V	110 V	120 V
°C (°F)	l/s per kW (cfm/kW)	kW	kW	kW
11.0 (19.8)	75.5 (160)	17.2	18.7	20.2
11.3 (20.4)	73.2 (155)	17.7	19.3	20.8
11.7 (21.1)	70.8 (150)	18.3	20.0	21.5
12.1 (21.8)	68.4 (145)	19.0	20.6	22.2
12.5 (22.6)	66.1 (140)	19.6	21.4	23.0
13.0 (23.4)	63.7 (135)	20.4	22.2	23.9
13.5 (24.3)	61.4 (130)	21.2	23.0	24.8
14.1 (25.3)	59.0 (125)	22.0	24.0	25.8
14.6 (26.4)	56.6 (120)	22.9	25.0	26.9
15.3 (27.5)	54.3 (115)	23.9	26.0	28.1
15.9 (28.7)	51.9 (110)	25.0	27.2	29.3

ACRA101

IT Equipment ΔT	IT Equipment Air Flow	Recommended Capacity Limit				
		200 V	208 V	220 V	230 V	240 V
°C (°F)	l/s per kW (cfm/kW)	kW	kW	kW	kW	kW
11.0 (19.8)	75.5 (160)	17.0	17.7	18.6	19.3	20.0
11.3 (20.4)	73.2 (155)	17.6	18.2	19.2	19.9	20.6
11.7 (21.1)	70.8 (150)	18.2	18.8	19.8	20.6	21.3
12.1 (21.8)	68.4 (145)	18.8	19.5	20.5	21.3	22.1
12.5 (22.6)	66.1 (140)	19.5	20.2	21.2	22.1	22.9
13.0 (23.4)	63.7 (135)	20.2	20.9	22.0	22.9	23.7
13.5 (24.3)	61.4 (130)	21.0	21.7	22.9	23.8	24.6
14.1 (25.3)	59.0 (125)	21.8	22.6	23.8	24.7	25.6
14.6 (26.4)	56.6 (120)	22.7	23.6	24.8	25.8	26.7
15.3 (27.5)	54.3 (115)	23.7	24.6	25.8	26.9	27.8
15.9 (28.7)	51.9 (110)	24.8	25.7	27.0	28.8	29.1

Performance Specification 14.4°C(58°F) Evap Temperature

Return Air conditions °C (°F)	ACRA100 Sensible Capacity* KW(BTU/hr)	ACRA101Sensible Capacity** KW(BTU/hr)
26.7 DB, 17.1 WB(80 DB,62.8 WB)	15.2 (51800)	15.0 (51400)
29.4 DB, 18.1 WB(85 DB,64.6 WB)	19.2 (65600)	19.1 (65100)
32.2 DB, 19.0 WB(90 DB,66.2 WB)	22.6 (77100)	22.4 (76500)
35.0 DB, 19.9 WB(95 DB,67.8 WB)	25.5 (87200)	25.3 (86500)
37.8 DB, 20.7 WB(100 DB,69.3 WB)	28.9 (98800)	28.7 (98100)
40.6 DB, 21.6 WB(105 DB,70.8 WB)	31.4 (107200)	31.2 (106400)

Note: * All values are accurate to +/- 1 kW (3415 BTU/hr) and based on full airflow of 1520 l/s (3220CFM at 120V/60Hz)
Note: ** All values are accurate to +/- 1 kW (3415 BTU/hr) and based on full airflow of 1510 l/s (3200 CFM at 240V/60Hz)
Note: Dewpoint must be 13.3°C (56°F) Or lower to achieve conditions listed in table.
Note: Sensible Heat Ratio = 1

Performance Specifications

Performance at Percentage of Fan Speed
SKU: ACRA100

% Fan Speed	L/s (SCFM)	Unit Power (Watts)	Net Sensible Capacity kW (BTU/h)	SA Temp ºC (ºF)
Return Air Condition = 29.4º C DB, 18.1º C WB (85º F DB, 64.6º F WB)				
40	630.2 (1335)	98	8.6 (29400)	18.1 (64.7)
50	752.0 (1593)	154	10.1 (34300)	18.4 (65.1)
60	943.7 (1999)	252	12.3 (42100)	18.6 (65.6)
70	1142.6 (2421)	391	14.7 (50200)	18.8 (65.9)
79*	1298.0 (2750)	559	16.5 (56500)	18.9 (66.0)
80	1317.0 (2790)	543	16.8 (57200)	18.9 (66.1)
88*	1413.0 (2994)	763	17.9 (61100)	19.0 (66.2)
90	1469.7 (3114)	681	18.6 (63400)	19.0 (66.2)
100	1520.0 (3220)	833	19.2 (65600)	19.0 (66.2)
Return Air Condition = 35.0º C DB, 19.9º C WB (95º F DB, 67.8º F WB)				
40	630.2 (1335)	98	11.4 (38800)	20.2 (68.3)
50	752.0 (1593)	154	13.3 (45400)	20.4 (68.8)
60	943.7 (1999)	252	16.3 (55800)	20.7 (69.3)
70	1142.6 (2421)	391	19.5 (66600)	20.9 (69.7)
79*	1298.0 (2750)	559	22.0 (75000)	21.1 (70.0)
80	1317.0 (2790)	543	22.3 (76000)	21.1 (70.0)
88*	1413.0 (2994)	763	23.8 (81300)	21.1 (70.0)
90	1469.7 (3114)	681	24.7 (84300)	21.2 (70.1)
100	1520.0 (3220)	833	25.5 (87200)	21.2 (70.1)
Return Air Condition = 40.6º C DB, 21.6º C WB (105ºF DB, 70.8º F WB)				
40	630.2 (1335)	98	15.3 (52300)	20.6 (69.1)
50	752.0 (1593)	154	17.5 (59800)	21.4 (70.6)
60	943.7 (1999)	252	21.0 (71600)	22.3 (72.2)
70	1142.6 (2421)	391	24.5 (83800)	22.9 (73.2)
79*	1298.0 (2750)	559	27.3 (93400)	23.3 (73.9)
80	1317.0 (2790)	543	27.7 (94500)	23.3 (73.9)
88*	1413.0 (2994)	763	29.4 (100400)	23.5 (74.3)
90	1469.7 (3114)	681	30.4 (103900)	23.5 (74.3)
100	1520.0 (3220)	833	31.4 (107200)	23.6 (74.5)
*See voltage derate table.				

Voltage Derate Table
SKU: ACRA100

Input Voltage (V)	120	110	100
Max Fan Speed (%)	100	88	79

Performance at Percentage of Fan Speed
SKU: ACRA101

% Fan Speed	L/s (SCFM)	Unit Power (Watts)	Net Sensible Capacity kW (BTU/h)	SA Temp ºC (ºF)
Return Air Condition = 29.4º C DB, 18.1º C WB (85º F DB, 64.6º F WB)				
40	643.9 (1364)	96	8.8 (29963)	18.2 (64.7)
50	757.3 (1604)	163	10.1 (34600)	18.4 (65.1)
60	954.2 (2022)	258	12.5 (42500)	18.6 (65.6)
70	1150.0 (2437)	391	14.8 (50500)	18.8 (65.9)
78*	1286.5 (2726)	506	16.4 (56000)	18.9 (66.0)
80	1319.7 (2796)	543	16.8 (57300)	18.9 (66.0)
81*	1334.2 (2827)	555	17.0 (57900)	18.9 (66.0)
85*	1402.1 (2971)	632	17.8 (60700)	19.0 (66.2)
88*	1458.7 (3090)	702	18.4 (63000)	19.0 (66.2)
90	1477.9 (3131)	727	18.7 (63800)	19.0 (66.2)
100	1510.4 (3200)	770	19.1 (65100)	19.0 (66.2)
Return Air Condition = 35.0º C DB, 19.9º C WB (95º F DB, 67.8º F WB)				
40	643.9 (1364)	96	11.6 (39523)	20.2 (68.4)
50	757.3 (1604)	163	13.4 (45700)	20.5 (68.8)
60	954.2 (2022)	258	16.5 (56400)	20.8 (69.4)
70	1150.0 (2437)	391	19.6 (67000)	21.0 (69.7)
78*	1286.5 (2726)	506	21.8 (74400)	21.1 (69.9)
80	1319.7 (2796)	543	22.3 (76200)	21.1 (69.9)
81*	1334.2 (2827)	555	22.5 (77000)	21.1 (69.9)
85*	1402.1 (2971)	632	23.6 (80700)	21.1 (69.9)
88*	1458.7 (3090)	702	24.5 (83700)	21.2 (70.1)
90	1477.9 (3131)	727	24.8 (84800)	21.2 (70.1)
100	1510.4 (3200)	770	25.3 (86500)	21.2 (70.1)
Return Air Condition = 40.6º C DB, 21.6º C WB (105ºF DB, 70.8º F WB)				
40	643.9 (1364)	96	15.6 (53135)	20.7 (69.3)
50	757.3 (1604)	163	17.6 (60100)	21.5 (70.6)
60	954.2 (2022)	258	21.1 (72200)	22.3 (72.2)
70	1150.0 (2437)	391	24.7 (84300)	22.9 (73.3)
78*	1286.5 (2726)	506	27.1 (92700)	23.2 (73.8)
80	1319.7 (2796)	543	27.7 (94700)	23.3 (74.0)
81*	1334.2 (2827)	555	28.0 (95600)	23.3 (74.0)
85*	1402.1 (2971)	632	29.2 (99800)	23.4 (74.2)
88*	1458.7 (3090)	702	30.2 (103200)	23.5?74.4)
90	1477.9 (3131)	727	30.6 (104400)	23.6 (74.5)
100	1510.4 (3200)	770	31.2 (106400)	23.6 (74.5)
*See voltage derate table.				

Voltage Derate Table
SKU: ACRA101

Input Voltage (V)	240	230	220	208	200
Max Fan Speed (%)	100	88	85	81	78

General Data

General Specifications

MODEL		ACRA100 Series	ACRA101 Series
AIR SYSTEM - FAN (Standard Filter Installed)			
	Size - mm (in)	250 (9.8)	
	Air Volume - l/s (SCFM)	1519.7 (3220)*	1510 (3200)**
	Fan Motor - W (HP) each	160 (0.22)	170 (0.24)
	Number of fans	5	
COOLING COIL - COPPER TUBE/ALUMINUM FIN			
	Face Area - m^2 (ft^2)	0.84 (9.04)	
FILTERS - WASHABLE - STANDARD			
	Quantity	2	
	Size - mm (in)	238 X 933 (9.375 X 36.75)	
	Depth - mm (in)	13 (1/2)	
	Efficiency (%)	<20% MERV 1	
PHYSICAL DATA - NET			
	Weight - kg (lbs)	152 (335)	160 (353)
	Height - mm (in)	1991 (78.39)	
	Width - mm (in)	300 (11.8)	
	Depth - mm (in)	1070 (42.13)	
PHYSICAL DATA - SHIPPING			
	Weight - kg (lbs)	194 (428)	202 (446)
	Height - mm (in)	2156 (84.88)	
	Width - mm (in)	879 (34.61)	
	Depth - mm (in)	1137 (44.76)	
CONNECTION SIZES - LIQUID			
	Supply liquid	1-1/4-in - 12 threaded ring seal	
	Return vapor	1 3/4-in - 12 threaded ring seal	
REFRIGERANT			
	Type	R-134a	
	Charge - kg (lb)	3.1 (6.9)	
ELECTRICAL			
	Input Power Range	100-120V/1~/50/60 Hz	200-240V/1~/50/60 Hz

Note: Maximum distance between the RDU and the farthest cooling module is 24.4 equivalent meters (80 equivalent feet).

* Voltage derate
Maximum Airflow at 120V = 1519.7 l/s (3220 CFM)
Maximum Airflow at 110V = 1413 l/s (2994 CFM)
Maximum Airflow at 100V = 1298 l/a (2750 CFM)

**Voltage derate
Maximum Airflow at 240V = 1510 l/s (3200 CFM)
Maximum Airflow at 230V = 1459 l/s (3090 CFM)
Maximum Airflow at 220V = 1402 l/a (2971 CFM)
Maximum Airflow at 208V = 1334 l/s (2827 CFM)
Maximum Airflow at 200V = 1286 l/a (2726 CFM)

Altitude Correction Factors

Room Condition: 72F DB / 50%RH											
Altitude - m (ft)	0	305 (1,000)	610 (2,000)	915 (3,000)	1,219 (4,000)	1,524 (5,000)	1,829 (6,000)	2,134 (7,000)	2,438 (8,000)	2,743 (9,000)	3,048 (10,000)
Specific Volume m^3/g (ft^3/lb)	8.48 (13.58)	8.80 (14.09)	9.13 (14.62)	9.48 (15.18)	9.84 (15.76)	10.21 (16.36)	10.61 (17.00)	11.03 (17.67)	11.47 (18.37)	11.93 (19.11)	12.42 (19.89)
Density g/m^3 (lb/ft^3)	118.54 (0.074)	113.73 (0.071)	108.93 (0.068)	105.72 (0.066)	100.92 (0.063)	97.71 (0.061)	94.51 (0.059)	91.31 (0.057)	86.50 (0.054)	83.30 (0.052)	80.09 (0.05)
Density Ratio	1	0.964	0.929	0.895	0.862	0.83	0.799	0.769	0.739	0.711	0.683
Capacity Correction	1	0.981	0.962	0.933	0.913	0.884	0.865	0.846	0.826	0.807	0.787
Density ratio is used for air flow correction factor. Capacity correction is used to derate performance											

Sound Performance Data - ACRA100

Fan Speed %	Fan RPM	Airflow L/s(SCFM)	Average Lp Sound Pressure dB re: 20 µPa dBA
40	1274	630.2 (1335)	56.4
50	1478	752.0 (1593)	62.3
60	1808	943.7 (1999)	67.8
70	2122	1142.6 (2421)	71.7
79*	2319	1298.0 (2750)	72.9
80	2411	1317.0 (2790)	74.4
88*	2560	1413.0 (2994)	74.7
90	2684	1469.7 (3114)	76.2
100	2769	1522.7 (3220)	76.8

Note: Sound tested at 1.8 m (5.9 ft) distance from the unit and 1 m (3.3 ft) height from the floor.
*See above voltage derate table.

Sound Performance Data - ACRA101

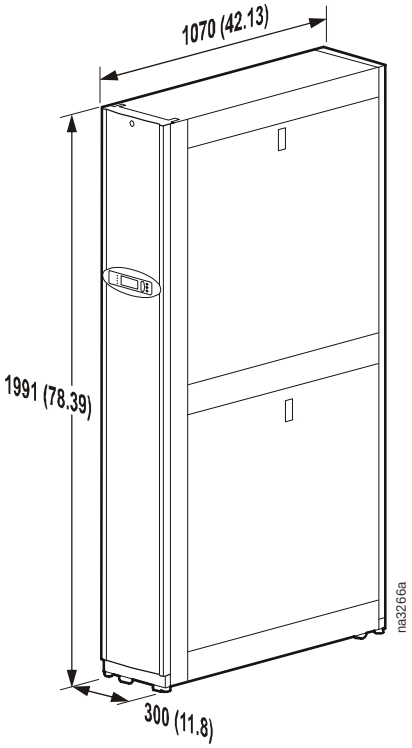
Fan Speed %	Fan RPM	Airflow L/s(SCFM)	Average Lp Sound Pressure dB re: 20 µPa dBA
40	1296	643.9 (1364)	55.9
50	1484	757.3 (1604)	63.1
60	1809	954.2 (2022)	68.1
70	2133	1150.0 (2437)	72.2
78*	2358	1286.5 (2726)	74.4
80	2413	1319.7 (2796)	75.5
81*	2437	1334.2 (2827)	75.5
85*	2550	1402.1 (2971)	76.7
88*	2643	1458.7 (3090)	77.0
90	2675	1477.9 (3131)	78.0
100	2729	1519.7 (3200)	78.5

Note: Sound tested at 1.8 m (5.9 ft) distance from the unit and 1 m (3.3 ft) height from the floor.
*See above voltage derate table.

Electrical Data

SKU	Power (Watts)	MCA	MOP	Plug Type
ACRA100 100-120V / 1~ / 50/60 Hz	833	N/A	20A	NEMA L5-20P
ACRA101 200-240V / 1~ / 50/60 Hz	770	N/A	20A	IEC-309 16/20A
Note: Above data is based on maximum operating condition. Note: Installation must comply with local and/or national electrical codes.				

Weights and Dimensions



Model	Packed weight	Unpacked weight
ACRA100	194 kg (428 lb)	152 kg (335 lb)
ACRA101	202 kg (446 lb)	160 kg (353 lb)

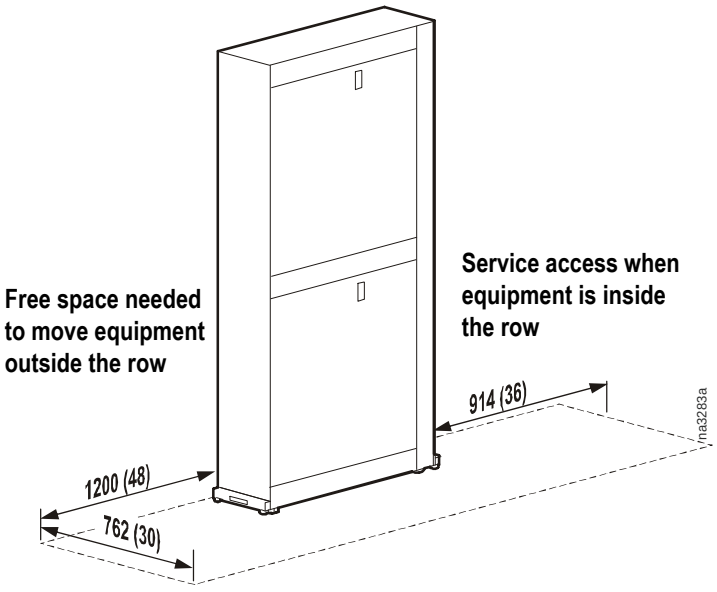
Note: For piping weights and dimension, see the RDU Technical Data Manual.

Dimensions are shown in mm (in).

Service access

A minimum 914 mm (36 in) of clear floor space in front of and behind the equipment is recommended for service. All required periodic maintenance can be performed from the front or rear of the equipment.

Use the casters on the equipment to move it outside the data center for service. A minimum of 1200 mm (48 in) of clear floor space in front of or behind the equipment is recommended to roll out the equipment.

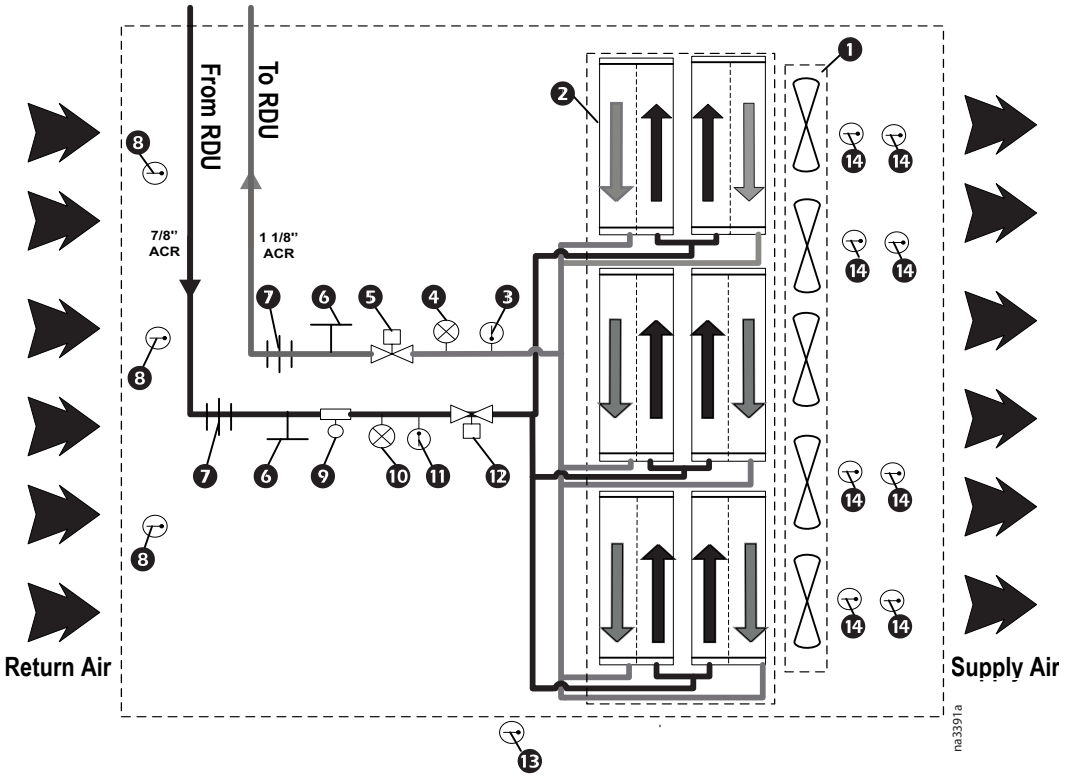

Free space needed to move equipment outside the row
Service access when equipment is inside the row
914 (36)
1200 (48)
762 (30)
na3283a

Dimensions are shown in mm (in).

Note: Check local and national codes and regulations for additional service access requirements.

Piping and Mechanical Connections

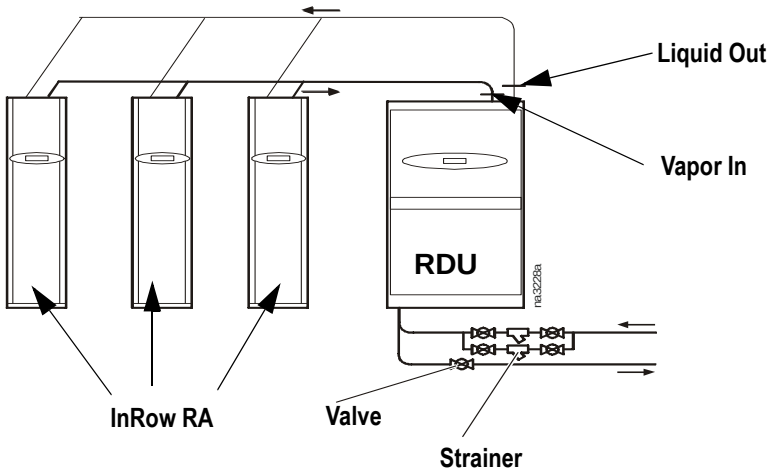
Internal Piping



Item	Description
❶	Fan
❷	Micro-channel coil
❸	Return vapor temperature sensor
❹	Refrigerant vapor pressure sensor
❺	Evaporator pressure regulator (EPR)
❻	Service port
❼	Threaded ring seal adapter

Item	Description
❽	Return air temperature sensors
❾	Solenoid valve
❿	Refrigerant liquid pressure sensor
⓫	Supply liquid temperature sensor
⓬	Electronic expansion valve (EEV)
⓭	Remote rack inlet temperature sensor
⓮	Supply air temperature sensors

External Piping



Guide Specifications

PART 1 — GENERAL

1.01 SUMMARY

A. The environmental control system shall be designed specifically for precision temperature control applications. It will automatically monitor and control cooling and filtering functions for the conditioned space. The system shall be built to the highest quality engineering and manufacturing standards, and shall be floor mounted and configured for horizontal airflow, with draw-through air pattern, to provide uniform air distribution over the entire face of the coil.

1.02 DESIGN REQUIREMENTS

A. The system shall be as described in the following specification as manufactured by APC.

1. Model: _____.
2. Total net cooling capacity: _____ kW (MBH).
3. Sensible net cooling capacity: _____ kW (MBH).
4. Return air dry bulb temperature: _____ º C (º F) DB.
5. Return air wet bulb temperature: _____ º C (º F) WB.
6. Air Volume: _____ L/s (CFM).
7. Electrical supply: _____ V, _____ Hz.

1.03 SUBMITTALS

A. Submittals shall be provided with the proposal and shall include: capacity data, electrical data, physical data, electrical connection drawing, and piping connection drawing.

1.04 QUALITY ASSURANCE

A. The system shall be completely factory-tested prior to shipment. Testing shall include, but not be limited to: complete pressure and leak testing to ensure system integrity, “Hi-Pot” test, and controls calibration and settings. Each system shall ship with a completed test report to verify completion of factory testing procedure. The system shall be NTRL listed, MCA, and electrical system shall be UL Listed to UL 1995 and CSA 22.2 No. 236.

1.05 STANDARD COMPONENTS

A. CABINET CONSTRUCTION

1. Exterior panels shall be 18 gauge metal with 80 kg/m3 (5 lb/ft3) density foam insulation. Insulation complies with UL94-5VA ASTM E84 flame spread and smoke developed rating of 25/50. Front and rear exterior panels shall be 18 gauge perforated steel with 69.5% open free area, and equipped with a keyed lock to provide a means of securing access to the internal components of the unit.
2. The frame shall be constructed of 16 gauge formed steel welded for maximum strength. All units shall provide full service from the front and rear, allowing units to be placed within a row of racks.
3. All exterior panels and frame shall be powder coated for durability and attractive finish. Exterior frame and panel color shall have color values: L = 74.50, a = -.53, b = +8.20.
4. Units shall include casters and leveling feet to allow ease of installation in the row and provide a means to level the equipment with adjacent IT racks.

B. VARIABLE SPEED DIRECT DRIVE MIXED FLOW AC FAN ASSEMBLY

1. Fan: The unit shall be configured for draw-through air pattern to provide uniform air flow over the entire face of the coil. Each unit shall include five 250 mm mixed flow direct drive AC axial fans. For the ACRA100, each fan assembly should be designed to provide 644 CFM (304 l/s) for total unit airflow of 3220 CFM (1520 l/s). For the ACRA101, each fan assembly should be designed to provide 640 CFM (302 l/s) for total unit airflow of 3200 CFM (1510.2 l/s).
2. Variable Speed Fans: Fans shall be variable speed capable of modulating from 60% to 100%. Fans shall soft-start to minimize in-rush current when starting.
3. Fan Protection: Each fan assembly shall consist of a plastic injection molded bezel with integral fan inlet/outlet cage type finger guard.
4. Operation and Service: The unit should be capable of operation in the event of a single fan failure. Fans shall be replaceable while the unit is in operation.

C. MICROPROCESSOR CONTROLLER

1. Monitoring and Configuration: The master display shall allow monitoring and control of the air conditioning unit through a menu-based control. Functions include status reporting and on/off control of the unit. Four LEDs report the operational status of the connected air conditioning unit.

2. Alarms: The microprocessor controller shall activate a visible alarm in the occurrence of the following events:
    a. Air filter service interval expired
    b. Evaporative temperature below dewpoint
    c. Individual fan fault
    d. Group communication fault
    e. Liquid inlet pressure sensor fault
    f. Liquid temperature sensor fault
    g. Primary/secondary power source failure
    h. Primary/secondary power source overvoltage
    i. Rack temperature sensor fault
    j. Rack temperature high violation
    k. RDU communications fault
    l. Return air high temperature violation
    m. Individual return air temperature sensor fault
    n. Supply air high temperature violation
    o. Individual supply air temperature sensor fault
    p. Unit in maintenance mode
    q. Unit ID needs configuration
    r. Unit personality not configured
    s. Vapor outlet pressure sensor failure
    t. Vapor temperature sensor fault

D. COOLING COIL

1. Cooling coil shall be an aluminum micro-channel heat exchanger. Coil end supports shall be a minimum 16 gauge galvanized steel. Coil shall be rated for a maximum pressure of 200 psig (2757.9 kPa).
2. Connections shall be 1-1/4” - 12 rotolok for supply and 1-3/4” - 12 rotolok for return.

E. WASHABLE FILTERS

The standard air filter shall be <20% efficient per ASHRAE 52.1, MERV 1 per ASHRAE 52.2, 1/2-in washable mesh filter.

F. REMOTE TEMPERATURE SENSOR

Remote temperature sensor shall ship with the unit for placement in the field to provide control input based on rack inlet temperature.

1.06 ELECTRICAL REQUIREMENTS

A. POWER INPUT

1. Each cooling unit shall be either 100-120V-1ph-50/60Hz (ACRA100) or 200-240V-1ph-50/60Hz (ACRA101).
2. Each cooling unit is supplied with two of the appropriate power cords based on the model.
3. The power feed shall automatically switch from primary to secondary source in the event of a power failure.

PART 2 — INSTALLATION

The ACRA unit will provide years of trouble-free service when installed and maintained by technically qualified personnel. For more detailed information, see the ACRA installation manual (990-3687).

PART 3 — STARTUP

3.01 (REFER TO OPERATION / MAINTENANCE MANUALS FOR COMPLETE INSTRUCTIONS)

A. STARTUP

1. Startup the air conditioning units in accordance with the manufacturer's startup instructions.
2. Test controls to demonstrate compliance with requirements.

Guidelines for Installation

The InRow RA uses cooled refrigerant to provide low temperature air which achieves reliable, accurate temperature control of computer rooms, laboratories, and other environments that require close tolerance control. The unit incorporates the latest system design innovations to provide you with optimum efficiency, reliability, and accuracy of control.

The InRow RA unit will provide years of trouble-free service when installed and maintained by technically qualified personnel. For more detailed information, see the appropriate InRow RA Installation manual.

Room preparation

During the design of the room, consideration should be given to the following factors: ease of entry for the system, floor-loading factors, and accessibility of piping and wiring.

The room must be sealed with a vapor barrier to minimize moisture infiltration. Polyethylene film (plastic sheeting) is a good vapor barrier for ceiling and wall applications. Rubber- or plastic-based paints should be applied to concrete floors and walls. The room should be thoroughly insulated to minimize thermal loads and make-up air (if required) should be preconditioned to reduce additional temperature, filtration, and moisture loads.

Service access

A minimum 914 mm (36 in) of clear floor space in front of and behind the equipment shall be provided for service. All required periodic maintenance shall be performed from the front or rear of the equipment.

Receiving the unit

Your InRow RA has been completely tested and inspected prior to shipment. To ensure that you have received the unit in excellent condition, perform a careful inspection of the crating and the unit immediately upon receipt. Verify that all parts ordered were received as specified. Report any damage discovered to the freight carrier. If necessary, contact the APC field service department for help in repairing or replacing damaged parts. While APC is not responsible for damage incurred in transit, we want to make sure that you have no undue delays in your system start-up. See the unpacking sheet and installation manual for more information.

Rigging

As with all electrical and mechanical equipment, you must take care with proper rigging of your unit. Do not use piping for lifting or moving. When using a forklift to move the unit, use the shipping skid to protect the bottom of the unit. Four threaded 3/8” X 16 holes are provided in the top of the frame to accommodate lifting eye bolts that can be utilized to lift the unit.

Data center room volume requirements

Ensure the data center has sufficient interior volume to allow personnel to respond to any potential exposure to refrigerant (approximately 13 pounds per 1,000 ft3 in accordance with ASHRAE Standard 34-2007).

APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to access documents in the APC Knowledge Base and to submit customer support requests.
  - **www.apc.com** (Corporate Headquarters)
    Connect to localized APC Web sites for specific countries, each of which provides customer support information.
  - **www.apc.com/support/**
    Global support searching APC Knowledge Base and using e-support.
- Contact the APC Customer Support Center by telephone or e-mail.
  - Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

For information on how to obtain local customer support, contact the APC representative or other distributors from whom you purchased your APC product.

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